

Claims

1. A method of producing a plant having increased disease resistance, said method comprising the steps of:

- 5 a) providing a non-naturally occurring plant cell overexpressing a nucleic acid molecule encoding a calcium dependent protein kinase (CDPK) polypeptide; and
- b) regenerating a plant from said plant cell, wherein said CDPK polypeptide is expressed in said plant, increasing the resistance of said plant to disease as compared to a naturally-occurring plant.

2. The method of claim 1, wherein said plant cell is a dicotyledonous plant cell.

10 3. The method of claim 2, wherein said dicotyledonous plant cell is a cruciferous plant cell.

4. The method of claim 1, wherein said plant cell is a monocotyledonous plant cell.

5. The method of claim 1, wherein said disease is caused by a plant pathogen.

15 6. The method of claim 1, wherein said non-naturally occurring plant cell is a transgenic plant cell.

7. The method of claim 6, wherein said transgenic plant cell comprises a transgene that expresses a nucleic acid molecule encoding a CDPK polypeptide.

8. The method of claim 7, wherein said CDPK polypeptide is CDPK2.

9. The method of claim 7, wherein said CDPK polypeptide is CDPK4.

10. The method of claim 7, wherein said CDPK polypeptide consists essentially of a protein kinase domain.

5 11. The method of claim 7, wherein said CDPK polypeptide is a constitutively-active CDPK polypeptide.

12. The method of claim 7, wherein said transgene ectopically expresses said nucleic acid molecule encoding said CDPK polypeptide.

10 13. The method of claim 7, wherein the transgene comprises an inducible promoter.

14. The method of claim 7, wherein the transgene comprises a constitutive promoter.

15. The method of claim 7, wherein the transgene comprises a tissue-specific promoter.

15 16. The method of claim 7, wherein said nucleic acid molecule is either derived from *Arabidopsis* or is an ortholog thereof.

17. A method of conferring pathogen resistance on a plant, the method comprising the steps of:

20 a) crossing a pathogen resistant plant prepared by the method of claim 1 with a plant having susceptibility to a pathogen;

- b) recovering reproductive material from the progeny of the cross; and
- c) growing pathogen resistant plants from the reproductive material.

18. The method of claim 17, said method further comprising repetitively crossing the pathogen resistant progeny with disease susceptible plants, and selecting for
5 expression of pathogen resistance.

19. A method for breeding pathogen resistance into plants, said method comprising:

- a) selecting a plant that expresses a nucleic acid molecule encoding a CDPK polypeptide; and
- 10 b) selecting pathogen resistant progeny.

20. The method of claim 19, wherein said plant is a transgenic plant.

21. The method of claim 20, wherein said transgenic plant comprises a transgene that expresses a nucleic acid molecule encoding a CDPK polypeptide.

22. The method of claim 21, wherein said transgene ectopically expresses a
15 nucleic acid molecule encoding said CDPK polypeptide.

23. The method of claim 21, wherein said CDPK polypeptide is CDPK2.

24. The method of claim 21, wherein said CDPK polypeptide is CDPK4.

25. The method of claim 21, wherein the CDPK polypeptide consists essentially of the protein kinase domain.

26. The method of claim 21, wherein the CDPK polypeptide is a constitutively-active CDPK polypeptide.

27. A non-naturally occurring plant that expresses a nucleic acid molecule encoding a CDPK2 polypeptide.

5 28. The non-naturally occurring plant of claim 27, said plant comprising a transgene that includes a nucleic acid molecule encoding a CDPK2 polypeptide, expression of said nucleic acid molecule being under the control of an expression control region that is functional in a plant cell.

10 29. The non-naturally occurring plant of claim 28, wherein the nucleic acid molecule encoding said CDPK2 polypeptide is derived from a plant.

30. The non-naturally occurring plant of claim 28, wherein the CDPK2 polypeptide consists essentially of the protein kinase domain.

15 31. The non-naturally occurring plant of claim 28, wherein said transgene that encodes said CDPK2 polypeptide is either derived from *Arabidopsis* or is an ortholog thereof.

32. The non-naturally occurring plant of claim 27, wherein said plant is a dicotyledonous plant

33. The non-naturally occurring plant of claim 27, wherein said plant is a monocotyledonous plant.

34. A seed from the non-naturally occurring plant of claim 27.

35. A cell from the non-naturally plant of claim 27.

36. A non-naturally occurring plant that expresses a nucleic acid molecule encoding a CDPK4 polypeptide.

5 37. The non-naturally occurring plant of claim 36, said plant comprising a transgene that includes a nucleic acid molecule encoding a CDPK4 polypeptide, expression of said nucleic acid molecule being under the control of an expression control region that is functional in a plant cell.

10 38. The non-naturally occurring plant of claim 36, wherein the nucleic acid molecule encoding said CDPK4 polypeptide is derived from a plant.

39. The non-naturally occurring plant of claim 36, wherein the CDPK4 polypeptide consists essentially of the protein kinase domain.

40. The non-naturally occurring plant of claim 36, wherein the CDPK4 polypeptide is a constitutively-active CDPK4 polypeptide.

15 41. The non-naturally occurring plant of claim 36, wherein said transgene that encodes said CDPK4 polypeptide is either derived from *Arabidopsis* or is an ortholog thereof.

42. The non-naturally occurring plant of claim 36, wherein said plant is a dicot.

43. The non-naturally occurring plant of claim 36, wherein said plant is a monocot.

44. A seed from the non-naturally occurring plant of claim 36.

45. A cell from the non-naturally occurring plant of claim 36.

5 46. A vector comprising an expression control region functional in plant cells operably linked to a nucleic acid molecule encoding a CDPK4 polypeptide.

47. A vector of claim 46 wherein the CDPK4 polypeptide consists essentially of the protein kinase domain.

10 48. The vector of claim 46 wherein the nucleic acid molecule encoding said CDPK4 polypeptide or protein kinase domain is derived from a plant.

49. The vector of claim 46, wherein nucleic acid molecule encoding said CDPK4 polypeptide is a constitutively-active CDPK4 polypeptide.

50. The vector of claim 46 wherein said nucleic acid molecule that encodes said CDPK4 polypeptide is either derived from *Arabidopsis* or is an ortholog thereof.

15 51. A cell comprising the vector of claim 46.

52. The cell of claim 51, wherein said cell is a plant cell.

53. The cell of claim 51, wherein said cell is a prokaryotic cell.